The Coastal Theme

Proposal submitted to the Integrated Global Observing Strategy Partners, June 2003

1. Background and Rationale

Interest in coastal regions, along with resources dedicated to their observation, is rapidly expanding. This is due to an increased awareness of their ecological and socio-economic importance as well as their acute vulnerability, particularly within the context of global change. Coastal zones are the sites of some of the most important, productive and unique ecosystems on Earth and are home to abundant and diverse flora and fauna. Because of these valuable and accessible assets, coastal regions are centers of human population (upwards of 1 billion people worldwide) and commerce. Both the natural and human elements of coastal zones are vulnerable to disturbances associated with natural climate variability in conjunction with anthropogenic forcing. These disturbances impact the capacity of the coastal zone to support goods and services. As a result, the ability to detect and predict changes in coastal environmental indicators in a timely manner is crucial. This need remains largely unfulfilled.

Coastal zones are difficult to observe as they exhibit considerable physical, ecological, and geochemical heterogeneity often manifested by strong gradients and abrupt boundaries. Located at the interface of the oceanic, terrestrial and atmospheric domains, they are dynamic regions characterized by large fluxes of energy and matter. Natural and anthropogenic forcings drive variability over a broad spectrum of scales from the short-term (e.g., changes in sea state) and event scales (e.g., hurricanes) to the long-term (e.g., global change and related secular changes in sea level, nutrients and temperature). Spatially, global environmental changes become relevant to society in the coastal zone on local to regional scales (e.g., coastal flooding and erosion, harmful algal blooms, loss of critical habitats such as coral reefs and mangroves). Although local or regional in scale, such changes are occurring in coastal ecosystems globally. Sovereignty, trans-boundary, economic and security issues in coastal regions introduce an additional level of measurement complexity. The interfacial nature of coastal zones, i.e., scientifically, temporally, geospatially, and politically, means that making and coordinating observations at appropriate spatial and temporal scales is not an easy task.

A number of international conventions and agreements call for more effective management of the environment and sustained utilization of coastal resources[1]. To these ends, numerous national and international organizations have established research and monitoring programs that involve *in situ* measurements, remote sensing, or both. Most of these programs target marine environments or terrestrial environments, but rarely both, and too often their observing efforts are uncoordinated or redundant. However, despite the fact that achieving the goals of international environmental conventions requires rapid assessments and timely predictions of the effects of land-based activities, extraction of resources, and climate variability on coastal ecosystems, a strategy has yet to be formulated and implemented to coordinate and integrate observing activities in the coastal zone, particularly across the land-sea interface.

This document proposes the development of a *Coastal Theme* according to the guidelines of the Integrated Global Observing Strategy (IGOS) Partnership. The *Coastal Theme* will coordinate and strengthen present and future coastal observational capabilities (*in situ* measurements and remote sensing) and the attendant decision-making process by promoting development of an integrated, sustainable global observing strategy for the coastal zone that encompasses the margins of both land and sea. This effort will be an inclusive, community driven approach that brings together data providers and users in a common forum, enabling suppliers to respond to requirements that have been set by users, who in turn are provided with improved products and services needed to fulfill their missions that provide significant benefits to society. These include improved understanding of the effects of human activities in the context of variations in the weather, climate change, and basin scale oscillations and, consequently, the development of comprehensive, scientifically sound environmental policies that encompass the coastal zone from coastal drainage basin to the coastal ocean. Submission of this proposal is in response to an IGOS P-9 Meeting Action Item (May 31, 2002), i.e., that "CEOS/NOAA, in consultation with GOOS, GTOS, IGBP and the relevant communities to further develop discussion on the possibility of an IGOS Coastal Theme and to propose a way ahead at IGOS-P-10".

2. Objectives

Overall Goal:

> Develop a strategy for integrated global observations that will provide improved understanding of earth system variability and change in the coastal zone, with a particular emphasis on propagation of change and variability across the land-sea interface.

Specific Objectives:

The Coastal Theme will:

(1) Specify user driven requirements for *in situ* and remote observations (e.g., variables to be measured, appropriate time-space scales of observations, platforms/sensors to be used) of the linked terrestrial-marine-atmospheric environments of the coastal zone and the associated requirements for data management and models;

(2) Evaluate current and projected observation capabilities in terms of the extent to which they meet these requirements, identifying gaps, redundancies, and activities that need to be strengthened;

(3) Establish a framework to integrate observations (*in situ* and remote), particularly across boundaries, as time-space scales of variability differ dramatically between the terrestrial side and the marine side of the coastal zone;

(4) Incorporate the Coral Reef Sub-Theme.

These objectives provide a roadmap towards a more effective coastal observing strategy that is responsive to the common needs and goals of data suppliers and users. In this context, the *Coastal Theme* expects to produce a number of near-and long-term benefits:

- Identify gaps in observations and reduce unnecesary duplication
- Strengthen the linkage between *in situ* and space-based observations for coastal research and management applications
- Assist in the design and implementation of Global Observing Systems with coastal components, particularly GOOS and GTOS
- Help establish priorities for research and development projects that are likely to improve the operational elements of observing systems and other programmes
- Stimulate building of long-term coastal data sets by identifying continuity needs
- Enable improved products and services by facilitating the integration of coastal data across the land-ocean margins

3. Role and Responsibilities

Given the interdisciplinary nature of the coastal zone, and based on interests and needs expressed in recent workshops and meetings (see Section 5 and attachments), a broad base of IGOS Partners will contribute to and benefit from the development and successful implementation of the Coastal Theme. Foremost among these, representing observation users and suppliers are CEOS members (including NASA, NOAA, DLR), IGBP (including LOICZ), UNEP (including ICRAN, GPA, GIWA), the World Climate Research Programme, the World Weather Watch, the Global Atmosphere Watch, and the GOOS, GCOS and GTOS. These partners have recognized the immediate need to communicate, coordinate and integrate their respective activities, and are committed to addressing these needs through the strategic framework that the *Coastal Theme* would provide.

We propose that an initial working group be created comprised of individuals representing the above partners and the Coral Reef Sub-Theme. Within six weeks of the *Coastal Theme* proposal having been approved by the IGOS Partners, this working group, led by the below Co-Chairs, will coordinate nomination and confirmation of *Coastal Theme* team members and a steering committee that is representative of the entire spectrum of data users and providers. At this time, a definitive list of team members and their division of responsibilities will be provided to the IGOS-P Co-chairs by the *Coastal Theme* Team Co-Chairs. This team will then be responsible for delivering milestones identified below and coordinating with other IGOS Themes. An appropriate IGOS Partner(s) will then coordinate subsequent *Coastal Theme* implementation activities.

Coastal Theme Co-Chairs and Working Group:

Co-Chair (for providers): *Paul DiGiacomo* (CEOS/NOAA-NASA)
Co-Chair (for users): TBD following IGOS Partners Meeting

Martin Adriaanse (UNEP/GPA)
Eric Bayler (CEOS/NOAA)
Paula Bontempi (CEOS/NASA)
Robert Christian (GTOS)
Arthur Dahl (UNEP/ICRAN), Co-leader, Coral Reef Sub-theme
Julie Hall (SCOR)
Thomas Malone (GOOS)
Liana Talaue-McManus (IGBP/LOICZ)
Andreas Neumann (CEOS/DLR)
Alan Strong (CEOS/NOAA), Co-leader, Coral Reef Sub-theme

4. Linkages

In terms of linkages to approved IGOS Themes, there are several opportunities for mutually beneficial interactions and coordination. First, after integrating with the previously approved Coral Reef Sub-Theme, the *Coastal Theme* would leverage and complement most existing IGOS themes (i.e., Oceans, Carbon/Water Cycles, Geohazards), while identifying observation gaps and redundant resource allocation not addressed in these. Further, the *Coastal Theme* also provides an excellent opportunity for theme interaction and integration since the coastal zone is impacted by processes and phenomena, often intensified or magnified, which are characteristic of the above themes.

5. Milestones

The following list of milestones is tentative and will be updated and revised on an ongoing basis by the *Coastal Theme* Team.

- October 2002: Initial CEOS, GOOS and GTOS Meeting on developing *Coastal Theme*
- January 2003: *Coastal Theme* Workshop #1; workshop summary report
- January 2003: Status report on *Coastal Theme* to IGBP Science Committee
- February 2003: Status report on *Coastal Theme* Development at CEOS SIT Meeting.
- March 2003: Presentation on *Coastal Theme* at Coastal GTOS meeting
- March 2003: Presentation on *Coastal Theme* at COOP meeting (*to be rescheduled*)
- April 2003: Draft proposal for *Coastal Theme* submitted to IGOS Partners

- June 2003: Formal presentation of *Coastal Theme* proposal at IGOS-P-10 meeting
- July 2003: Confirmation of *Coastal Theme* Team Members
- September 2003: *Coastal Theme* Workshop #2; progress report to IGOS Partners
- October 2003: Distribution of Prospectus for *Coastal Theme*
- January 2004: *Coastal Theme* Workshop #3; progress report to IGOS Partners
- February 2004: Distribution of *Coastal Theme* Report Draft
- May 2004: Submission of Final *Coastal Theme* Report to IGOS Partners
- July 2004-: Publication of *Coastal Theme* Report; initiation of implementation phase

6. Reports/Products

The *Coastal Theme* Team will create a number of reports/products and distribute them to the IGOS Partners and a broad group of coastal observation users. These include:

1. A dedicated *Coastal Theme* Website and FTP server to distribute information about this developing effort (this will be linked to the sites of partners and users);
2. PowerPoint, poster, and PDF presentations for use in publicizing this effort at international coastal workshops and meetings; e.g., GOOS and GTOS panels and committees.
3. An *Coastal Theme* Report Prospectus (~ 10 pages) to attract interest, solicit feedback, and gain momentum within the IGOS and broader coastal observation user/provider communities;
4. A draft *Coastal Theme* Report distributed for comment in the IGOS and coastal communities;
5. A final *Coastal Theme* Report and Implementation Plan.

The final *Coastal Theme* report will provide a strategic roadmap for the IGOS Partners towards a sustainable, integrated, end-to-end global coastal observing strategy that satisfies the needs of a broad spectrum of users. It will be updated every three years.

7. Evaluation Criteria

Evaluation of Coastal Theme development:

1. Successfully meet the milestones of this proposal;
2. Work with and bring together all interested IGOS Partners (providers and users) and be responsive to their individual and common interests and needs;
3. Solicit internal (i.e., IGOS) and external feedback on the *Coastal Theme* prospectus and report;

4. Ability to attract broad community support of the *Coastal Theme* report and its recommendations.

Evaluation of Coastal Theme Report

1. Implementation of recommendations identified in the *Coastal Theme* report;
2. Updated Coastal Theme reports provided every three years and satisfactorily reviewed by a panel of coastal observation providers and users;
3. Successful progress and integration of the global observing system coastal modules;
4. Measurable policy response to the *Coastal Theme* report and its implementation.

8. Resources

The sponsoring IGOS Partners identified in Section 3 will provide sufficient resources for this effort to be successful in a timely manner, including support of their respective Coastal Theme Team members in their production of the prospectus, draft report, and final report and its implementation, as well as hosting two additional Coastal Theme Workshops to facilitate these efforts.

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[1] *Intergovernmental agreements that stipulate national obligations for cooperation include (1) the 1982 UN Convention on the Law of the Sea (UNCLOS, including the 1995 U.N. Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks), (2) Regional Seas Conventions, (3) the Jakarta Mandate, (4) the Ramsar Convention on Wetlands, (5) the Global Plan of Action on Land-Based Sources of Pollution, (6) the Safety of Life at Sea (SOLAS) Convention, (7) the Second World Climate Conference, and (3) two conventions and a program of action signed at the 1992 UN Conference on Environment and Development (UNCED) in Rio de Janeiro (the Framework Convention on Climate Change, Convention on Biodiversity, and the Program of Action for Sustainable Development or Agenda 21).*